

FIG. 1A

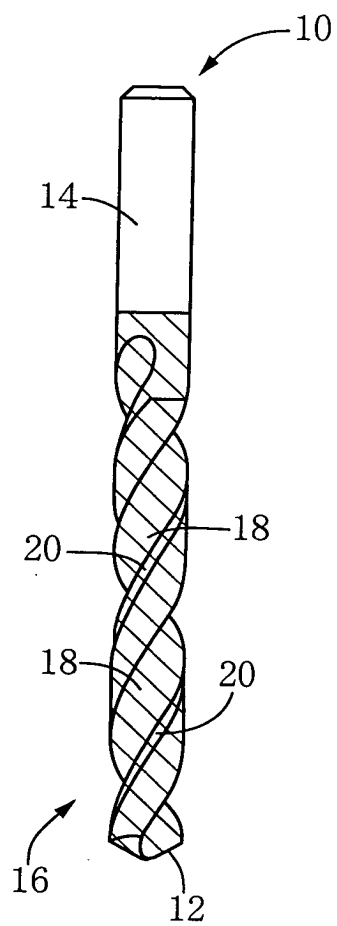


FIG. 1B

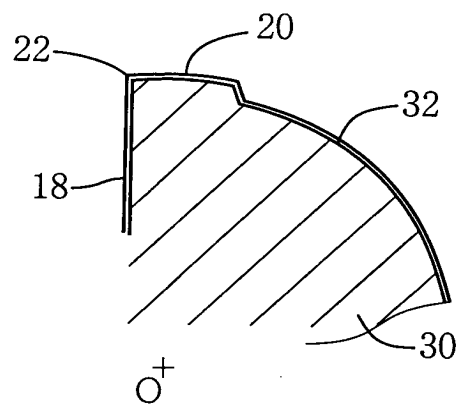


FIG. 2

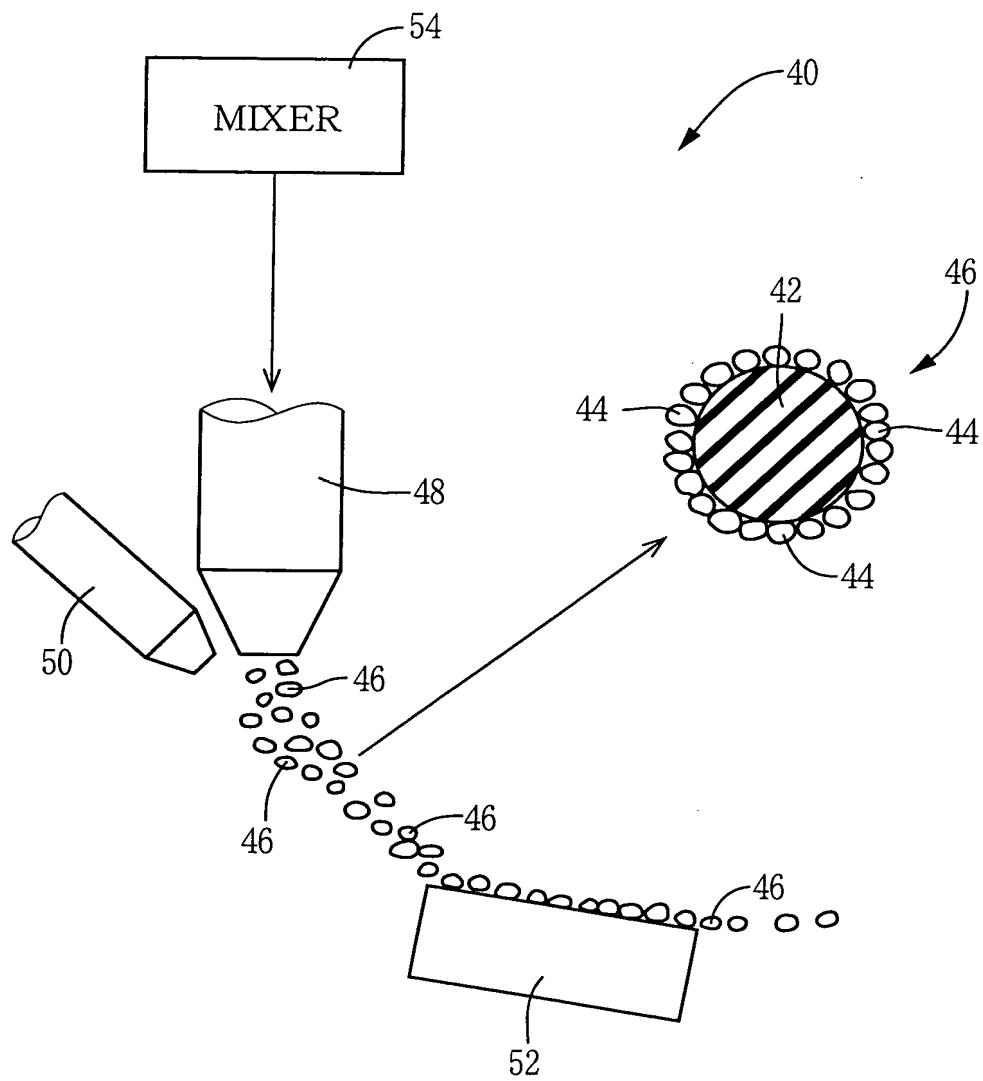


FIG. 3A

PHOTOGRAPH (×500) OF LEADING EDGE BEFORE SHOT BLASTING

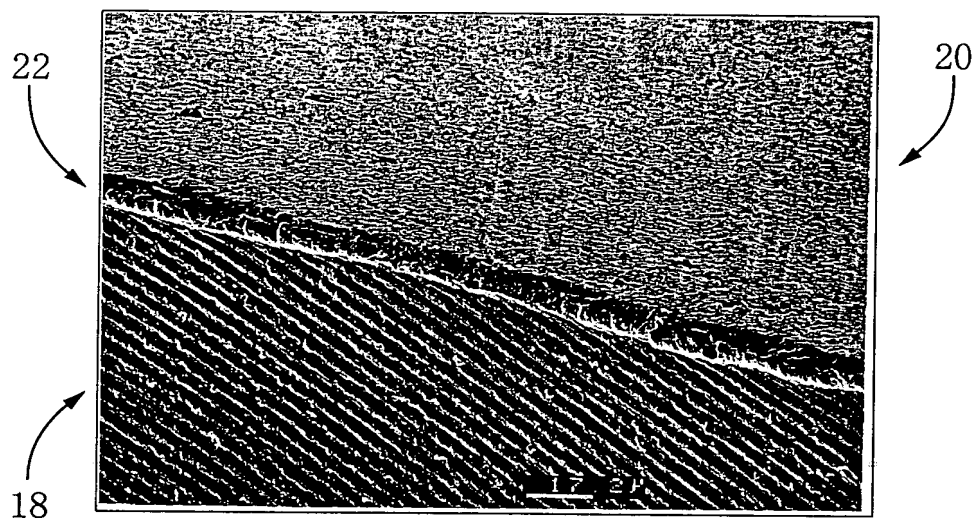


FIG. 3B

PHOTOGRAPH (×500) OF LEADING EDGE AFTER SHOT BLASTING

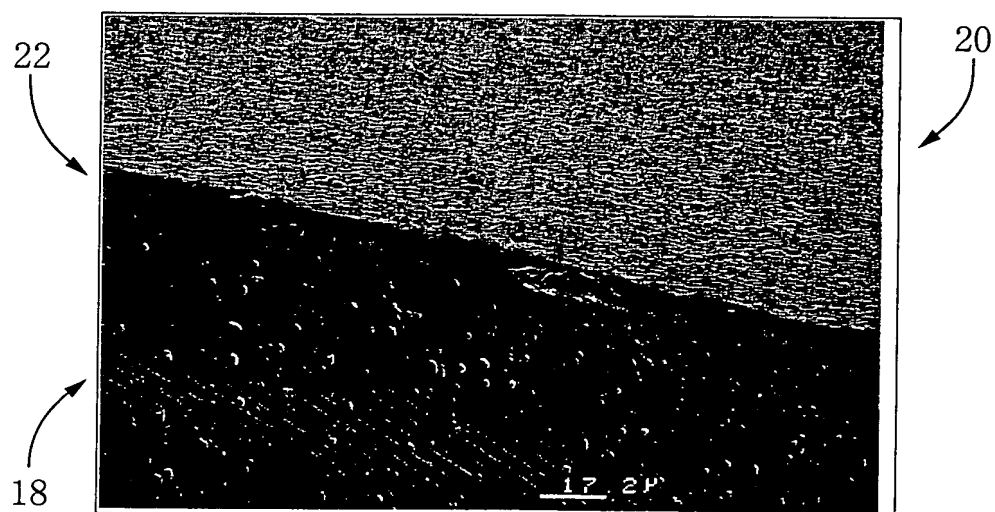


FIG. 4A

PHOTOGRAPH ($\times 2000$) OF MARGIN BEFORE SHOT BLASTING

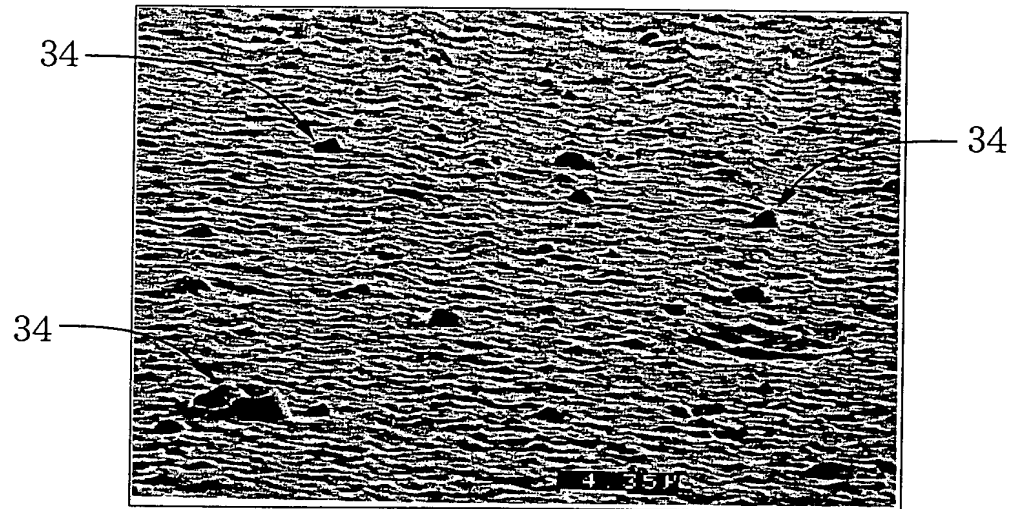


FIG. 4B

PHOTOGRAPH ($\times 2000$) OF MARGIN AFTER SHOT BLASTING

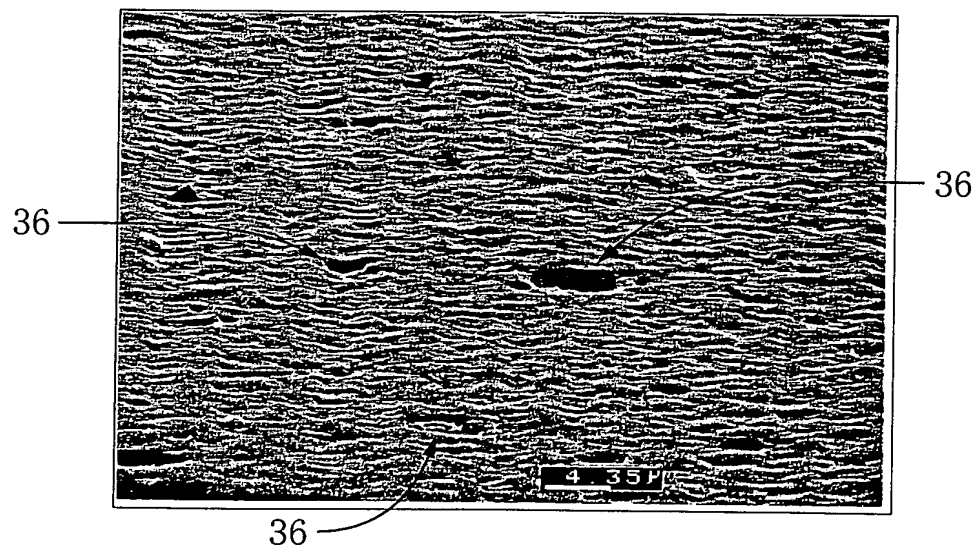


FIG. 5A

PHOTOGRAPH ($\times 2000$) OF FLUTE BEFORE SHOT BLASTING

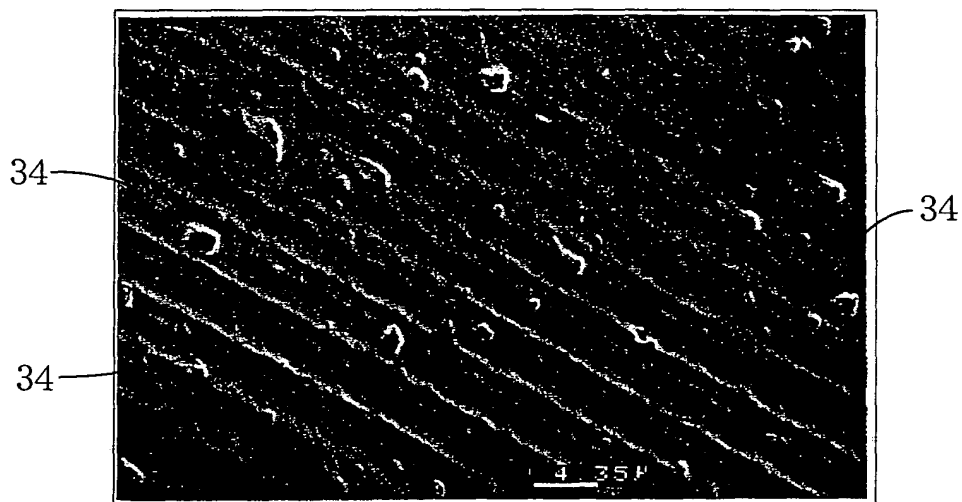


FIG. 5B

PHOTOGRAPH ($\times 2000$) OF FLUTE AFTER SHOT BLASTING

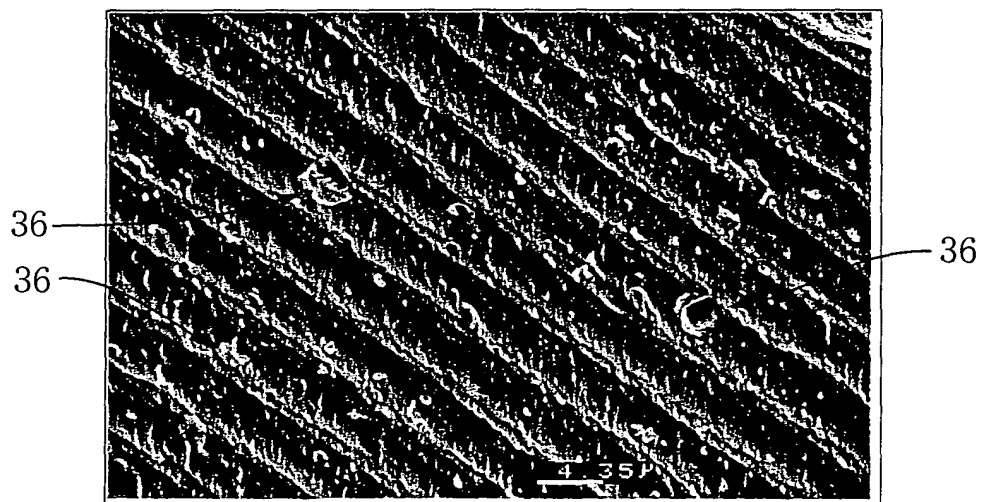


FIG. 6A

DRILL	SIZE	HARD COATING (TiCN)
No.1	$\phi 9.5$	COATING WITHOUT SHOT BLASTING
No.2	$\phi 9.5$	COATING WITH SHOT BLASTING TO DISTAL END PORTION
No.3	$\phi 9.5$	COATING WITH SHOT BLASTING TO ITS ENTIRETY

FIG. 6B

	CONDITION 1	CONDITION 2
WORK MATERIAL	S50C	SCM440(30HRC)
PERIPHERAL VELOCITY	34m/min	22m/min
FEED RATE	0.21mm/rev	
DEPTH OF HOLE	95mm (BLIND HOLE)	
DRILLING MODE	STEP DRILLING (WITH FIRST INFEEED DEPTH OF 20mm)	
CUTTING FLUID	WATER SOLUBLE FLUID	
USED MACHINE	HORIZONTAL TYPE MACHINING CENTER	

FIG. 6C


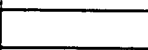
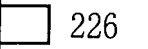
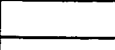
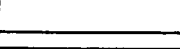
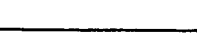
	DRILL	NUMBER OF DRILLED HOLES			
		100	200	300	
CONDITION 1	No.1	 120			
	No.2			268	
	No.3		 226		
CONDITION 2	No.1	 54			
	No.2	 85			
	No.3	 95			

FIG. 7A

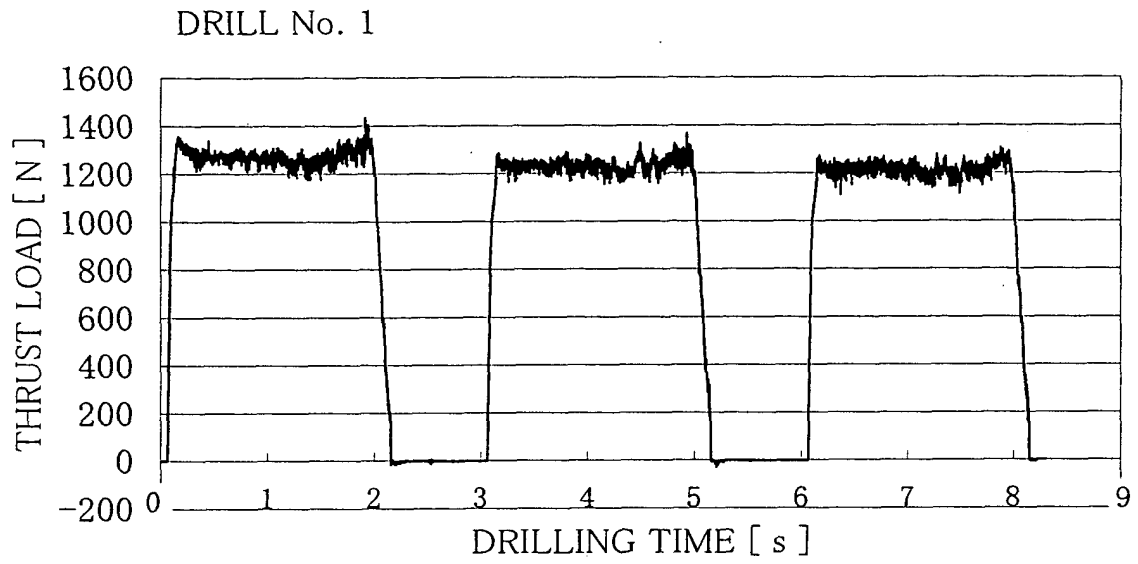


FIG. 7B

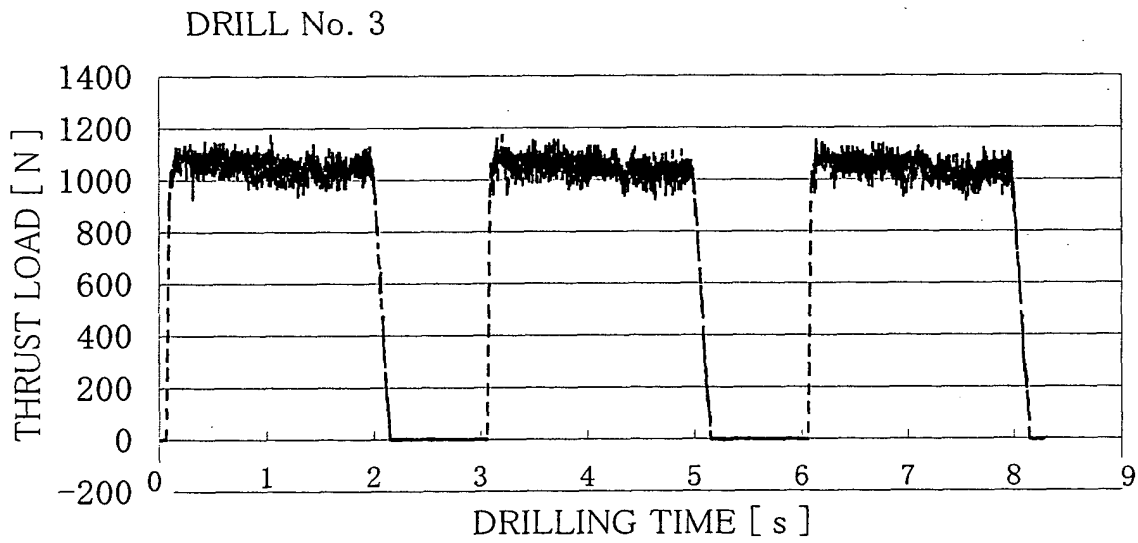


FIG. 8A

DRILL	SIZE	HARD COATING (TiCN)
No.1	φ5	NO COATING
No.2	φ5	COATING WITHOUT SHOT BLASTING
No.3	φ5	COATING WITH SHOT BLASTING TO ITS ENTIRETY

FIG. 8B

	CONDITION 3	CONDITION 4
WORK MATERIAL	S50C	SCM440(30HRC)
PERIPHERAL VELOCITY	23m/min	10m/min
FEED RATE	0.1mm/rev	0.09mm/rev
DEPTH OF HOLE	48mm (BLIND HOLE)	
DRILLING MODE	STEP DRILLING (WITH FIRST INFED DEPTH OF 25mm)	
CUTTING FLUID	WATER SOLUBLE FLUID	
USED MACHINE	HORIZONTAL TYPE MACHINING CENTER	

FIG. 8C

	DRILL	NUMBER OF DRILLED HOLES				
		100	200	300	400	
CONDITION 3	No.1		189			
	No.2			329		
	No.3				380	
CONDITION 4	No.1	29				
	No.2	2				
	No.3	72				

FIG. 9

DRILL	MEASURED PORTION	AFTER FORMATION OF FLUTE	AFTER FIRST SHOT-BLASTING	AFTER FORMATION OF COATING	AFTER SECOND SHOT-BLASTING	IMPROVEMENT RATIO
No. 7	MARGIN	1.20	0.94	2.00	0.58	71%
	FLUTE	0.82	0.68	1.34	1.02	24%
No. 8	MARGIN	1.22	0.54	1.38	0.86	38%
	FLUTE	1.22	0.48	1.30	1.06	18%
No. 9	MARGIN	1.06	0.66	1.42	0.74	48%
	FLUTE	1.06	0.62	1.74	0.76	56%

FIG. 10

